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Claims

1. A method for *in vivo* maintenance, expansion and/or differentiation of hematopoietic progenitor cells, comprising:

implanting into a subject a porous, solid matrix having pre-seeded hematopoietic progenitor cells and their progeny,

wherein the porous, solid matrix is an open cell porous matrix having a percent open space of at least 75% and a unitary microstructure.

2. The method of claim 1, further comprising the porous, solid matrix having pre-seeded hematopoietic progenitor cells and their progeny by the steps of:

introducing *in vitro* an amount of hematopoietic progenitor cells into the porous, solid matrix;

culturing the hematopoietic progenitor cells in an environment that is free of inoculated stromal cells, stromal cell conditioned medium, and exogenously added hematopoietic growth factors that promote hematopoietic cell maintenance, expansion and/or differentiation, other than serum.

3. The method of claim 2, wherein the porous solid matrix has pores defined by interconnecting ligaments having a diameter at midpoint, on average, of less than 150 $\mu$ m.

4. The method of claim 3, wherein the porous solid matrix is a metal-coated reticulated open cell foam of carbon containing material.

5. The method of claim 4, wherein the metal is selected from the group consisting of tantalum, titanium, platinum, niobium, hafnium, tungsten, and combinations thereof, wherein said metal is coated with a biological agent selected from the group consisting of collagens, fibronectins, laminins, integrins, angiogenic factors, anti-inflammatory factors, glycosaminoglycans, vitrogen, antibodies and fragments thereof, and combinations thereof.

6. The method of claim 5, wherein the metal is tantalum.

7. The method according to anyone of claims 1-6, wherein the porous, solid matrix having seeded hematopoietic progenitor cells and their progeny is impregnated with a gelatinous agent that occupies pores of the matrix.